

**Course Overview:**

The course covers the application of chemical engineering of applied process engineering. The course will be presented in interactive format with many industrial examples and case studies. Participants will have the opportunity to solve sample problems with the help of the instructor.

The first part of the course will cover the basics of unit operations and the development of an effective process. Topics included are the preparation of process flow diagrams (PFDs) and P&IDs. These diagrams represent the organization and control of equipment. This is followed by the calculation of material flows and the concept of a material balance. Included are techniques on the sizing and evaluation of piping networks (including pipe segments, fittings, parallel piping systems, valves and controls equipment).

Pressure drop calculations are presented for a variety of systems – ordinary Newtonian liquids, vapors and mixed phase systems, reacting systems, packed beds and fluidized beds.

Next, the design and evaluation of major fluid flow equipment is presented. This includes pumps (all types) and compressors as well as fans, vacuum pumps, ejectors and eductors. The associated drivers for these machines are discussed, especially steam turbines and the steam-power cycle found in refineries.

The materials portion of the course is followed by a presentation on energy balances and heat transfer equipment. Refrigeration energy balance, compressor selection, and power requirements are covered. Focus is on the cycles typically found in refineries and petrochemical plants, including cascaded and open systems.

**Course Objective:**

- Apply and gain an in-depth knowledge on process engineering and discuss the chemical & physical aspects as well as the processes and process variables used in applied process engineering
- Prepare PFDs and P&IDs in a professional manner
- Perform material/heat balance and fluid flow calculations
- Acquire knowledge with the various process development including process sketch, diagrams and unit operations
- Employ the application of fluid dynamics specifically its piping system design and flow systems and determine the different flow equipment used in process engineering
- Enumerate heat transfer components by explaining the elements of energy balances, heat exchangers, air coolers and fired heaters
- Develop an understanding on mass transfer attributes including distillation, tray performance & constraints, humification and refrigeration
- Identify the different types of chemical reactors and describe petroleum processing reactions including hydro treating, catalytic reforming & hydro cracking
- Discuss the process control applied in process engineering and identify the various construction materials as well as the method of selecting the materials to be used
- Carryout process risk analysis particularly the various evaluation methods and HAZOP study

**Course Outline:**

- Process Engineering Overview

**Training Language:**

English

**Training Methodology:**

- Presentation & Slides
- Audio Visual Aids
- Interactive Discussion
- Participatory Exercise
- Action Learning
- Class Activities
- Case Studies
- Workshops
- Simulation

- Chemical & Physical Principles
- Process Development
- Fluid Dynamics
- Flow Equipment
- Heat Transfer
- Mass Transfer
- Chemical Reactors
- Process Control
- Materials of Construction
- Process Risk Analysis

**Who Should Attend:**

This course provides an overview of the major elements of applied process engineering for process and project engineers as well as piping designers. The course will also be valuable as a refresher for experienced chemical engineers and those who are not familiar with some aspects of applied process engineering. Additionally, managers and supervisors who have no formal training in chemical engineering should find value in this course.